

ART. IV.—*The Nutrient Value of Artificial Sugar.*

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In the Proceedings of the Royal Society of Victoria, a method was described of rapidly polymerizing sugar in large quantity from formaldehyde solutions. The material obtained consists of a mixture of sugars with formates and other substances. By dissolving in water and partially precipitating with alcohol, a fair proportion of the sugar can be separated from the other materials.

A sample of 200 grams obtained in this way was dissolved in 5 litres of water containing 10 grams of ammonium nitrate, 10 grams of potassium phosphate, and 5 grams of magnesium sulphate. The flask was kept at 20°C.—30°C., and from time to time the bulk of the organisms filtered off by passing through a porous clay filter. A great variety of organisms developed. At first small pointed yeast cells predominated, but in the later stages mainly two rod-like bacteria were present, one 2 to 4 μ and the other 4 to 10 μ in length. After 10 months the liquid became sterile, and it was assumed that all the nutritious artificial sugars had been used up.

The remaining liquid was filtered and evaporated to a small bulk. After adding its own volume of alcohol, a dark gummy residue separated slowly. (Sample I.) To the filtrate twice its volume of alcohol was added. The precipitate was Sample II. The filtrate was evaporated to dryness, giving the residue, being Sample III.

Dr. Young and Mr. Vickery very kindly examined these samples, and reported in brief as follows:—

Sample I. gave a slight reduction with Fehling's test, but yielded no detectable osazone, and gave only a slight negative rotation (-0.5° through a 2 dm. tube). Estimated by reduction (Bertrand's method), the solution contained 0.04% of sugar expressed as glucose.

Sample II. gave a fair reduction with Fehling's, and a doubtful trace of fermentation. A 6% solution gave -0.16° to 0.017° rotation in a 2 dm. tube. By Bertrand's method it contained 0.15% of sugar, but it did not yield any distinct osazones.

Sample III. gave all the tests for pentose, but yielded no osazones. The greater bulk of the material was included in this sample.

The first sample apparently largely consisted of gummy materials, possibly partly derived from the organisms grown in the liquid. These organisms had removed most, but not all of the more nutritive hexose sugar, leaving very largely the pentoses of Sample III. These pentoses were evidently either unattacked or less vigorously attacked by the micro-organisms. Further investigations in this direction are in progress.